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Lab aids NASA in latest mapping mission

by John Brownlee, Space Vehicles Directorate

KIRTLAND AFB, N.M. – Air Force Research Laboratory space workers here were glued to their televisions recently as they watched the Space Shuttle Endeavour lift-off on a unique mission. Aboard was a critical composite structure technology the lab helped develop for an assignment with literally global implications: Create the most complete topographical map ever made that uniformly and accurately measures the elevation of the earth's geography.

"Led by the National Imagery and Mapping Agency and NASA, the 11-day Space Shuttle Radar Topography Mission was an international effort to obtain the most complete radar-based, high-resolution digital topographic database of the earth," said AFRL engineer Bob Acree. "Our role here at AFRL's Space Vehicles Directorate was to help build a composite mast to hold the radar apparatus steady enough to obtain clear images of the earth from orbit."

Tightly folded into the Endeavour's cargo bay, this enormous 60-meter (200-foot) mast, formed from strong yet lightweight composite graphite-epoxy and titanium, unfurled from the Shuttle and rigidly supported two radar antennas designed to scan the earth and collect very sharp images.

The $8 million boom-like structure, stable as Vermont granite, steadies the radar equipment like a tripod locks down a camera and prevents blurred photographs. Platform stability is especially important when you are high in orbit; excessive shakiness can distort the radar images and obscure accurate readings.

"We assisted a team of contractors by developing the fabrication process and then helped them make the struts for the mast in AFRL's Composite Structures Laboratory," Acree said. The final mast was assembled at AEC-Able Engineering, Co., in Goleta, California.

Pilots, city planners, scientists and other professions need precise topographical maps of deserts, mountain chains, and rain forests. Accurate navigation, reliable telecommunication systems and civil engineering projects require reliable maps. But they have not been previously available because measurement methods and standards used by different countries vary. Many topographical features, such as remote mountaintops and dense jungles, have been inaccessible to mapping parties on the ground.

Mapping from orbit solves the accessibility problem and using radar instead of regular optics allows round-the-clock operation that can also see through clouds that would otherwise block traditional cameras. **@**